

**AMENDMENTS TO THE CLAIMS**

**Please amend the claims as follows:**

1. (currently amended) A system for improved simulation of a biological system comprising a plurality of chemical reactions, the system comprising:

a modeling component for constructing a graphical model of a biological system including a first chemical reaction and a second chemical reaction, the graphical model including a specified constraint provided in addition to the chemical reactions that constrains dynamic behavior of the biological system;

a storage component for storing the graphical model of the biological system; and

a simulation engine accepting as input said constructed graphical model of the biological system and generating as output dynamic behavior of the biological system using a first type of computational model for the first chemical reaction, and a second type of computational model for the second chemical reaction, and the specified constraint.

2. (original) The system of claim 1 wherein the modeling component allows construction of a block diagram model of the biological system.

3. (original) The system of claim 2 wherein the modeling component further includes at least one block identifying a set of related chemical reactions.

4. (original) The system of claim 1 wherein the modeling component includes a graphical user interface for accepting user commands and data.

5. (original) The system of claim 1 wherein said first type of computational model is selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

6. (original) The system of claim 5 wherein said second type of computational model is selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

7. (original) The system of claim 1 wherein said second type of computational model is selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

8. (original) The system of claim 1 further comprising an analysis environment in communication with said simulation engine, said analysis environment displaying the dynamic behavior of the biological system.

9. (currently amended) An improved method for simulation of a biological system including a first chemical reaction and a second chemical reaction, the method comprising the steps of:

(a) constructing a graphical model of the biological system including a first chemical reaction and a second chemical reaction, the graphical model including a specified constraint provided in addition to the chemical reactions that constrains dynamic behavior of the biological system;

(b) storing the graphical model of the biological system; and

(c) generating dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction, and a second type of computational model for the second chemical reaction and the specified constraint.

10. (original) The method of claim 9 wherein step (a) comprises constructing a block diagram model of the biological system.

11. (original) The method of claim 10 wherein the block diagram model includes at least one block identifying a set of related chemical reactions.

12. (currently amended) The method of claim 9 wherein step (a) comprises:

(i) providing a graphical user interface for accepting user commands and data; and

(ii) constructing a graphical model of the biological system including a first chemical reaction and a second chemical reaction using the user commands and data.

13. (currently amended) The method of claim 9 wherein step (b)(c) comprises:

(i) generating an expected result of the first chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis; and

(ii) generating an expected result of the second chemical reaction.

14. (currently amended) The method of claim 9 wherein step (b)(c) comprises:

(i) generating an expected result of the first chemical reaction; and

(ii) generating an expected result of the second chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

15. (currently amended) The method of claim 9 further comprising the step of displaying the an expected result of the first chemical reaction or the second chemical reaction.

16. (currently amended) An article of manufacture having embodied thereon computer-readable program means for improved simulation of a biological system comprising a plurality of chemical reactions, the article of manufacture comprising:

computer-readable program means for constructing, using the received user commands and data, a graphical model of a biological system including a first chemical reaction and a second chemical reaction, the graphical model including a specified constraint provided in addition to the chemical reactions that constrains dynamic behavior of the biological system;

computer-readable program means for storing the graphical model of the biological system; and

computer-readable program means for generating, using the constructed graphical model of the biological system, dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction, and a second type of computational model for the second chemical reaction, and the specified constraint.

17. (original) The article of manufacture of claim 16 further comprising computer-readable program means for displaying the dynamic behavior that is generated.

18. (currently amended) The article of manufacture of claim 16 wherein said computer-readable program means for constructing a graphical model of the biological system comprises computer-readable program means for constructing a block diagram model of the biological system.

19. (original) The article of manufacture of claim 16 wherein said computer-readable program means for constructing a block diagram model of the biological system includes computer-readable program means for constructing at least one block identifying a set of related chemical reactions.

20. (original) The article of manufacture of claim 16 wherein computer-readable program means for generating dynamic behavior of the modeled biological system comprises computer-readable program means for generating an expected result of the first chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

21. (original) The article of manufacture of claim 16 wherein computer-readable program means for generating dynamic behavior of the modeled biological system comprises computer-readable program means for generating an expected result of the second chemical reaction using a computational model selected from the group consisting of ordinary differential equation analysis, partial differential equation analysis, difference equation analysis, algebraic equation analysis, and stochastic analysis.

22. (currently amended) The article of manufacture of claim 16 further comprises computer-readable program means for displaying thean expected results of the first chemical reaction or the second chemical reaction.

23-44. (canceled)

**Please add claims 45-47 as follows:**

45. (new) A computer-implemented method for simulation of a biological system including a first chemical reaction and a second chemical reaction, the method comprising:

constructing a graphical model of the biological system including a first chemical reaction and a second chemical reaction;

annotating the graphical model in response to a user requesting to add annotations to the model that are provided by the user;

storing the graphical model of the biological system; and

generating dynamic behavior of the modeled biological system using a first type of computational model for the first chemical reaction and a second type of computational model for the second chemical reaction.

46. (new) A computer-readable storage medium holding computer-executable instructions for simulation of a biological system, the medium comprising:

instructions for constructing a graphical model of the biological system including a first chemical reaction and a second chemical reaction in the biological system;

instructions for storing the graphical model of the biological system;

instructions for determining putative reaction times for execution of the first reaction and the second reaction in the graphical model;

instructions for sorting the putative reaction times;

instructions for executing one of the first reaction and second reaction identified by a first reaction, the first chemical reaction being executed using a first type of computational model and the second chemical reaction being executed using a second type of computational model;

instructions for recalculating the putative reaction times for the first reaction and the second reaction after executing one of the first reaction and the second reaction identified by the first reaction; and

instructions for resorting the putative reaction times.

47. (new) The medium of claim 46, further comprising:

instructions for iterating execution of the executing, recalculating and resorting instructions until a final simulation time has been reached to generate a dynamic behavior of the modeled biological system.